Rip Peter Ped Van Winkle

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Why are We Concerned with Soil Erosion?

- **Soil Productivity and World Food Supply**

- **Soil and Water Quality**

Erosion in Indiana

- **Soil loss at the rate of 5 tons per acre per year would result in 1" of soil being lost every 33 years (1" each generation)**

- **~ 25% of crop land eroding above T (Tolerable Loss ~ 4-5 tons/acre/year)**

- **~ 10% of land has an erosion greater than 2x T**

How much is a Ton of Soil?

- Ton of soil is roughly 30"X30"X30" in size
- Spread evenly is about the thickness of several sheets of paper over an acre.
- Five tons (typically "T" for Indiana soils is about thickness of a dime spread evenly over one acre.

Steps in Erosion

- **Detachment - particles must be separated for easy movement (silt and sand are easily detached)**

- **Transport - water or wind must be moving with enough force to keep particles suspended (finer particles stay suspended longer)**

Soil Erosion by Water

- Splash
- Sheet
- Rill
- Gully
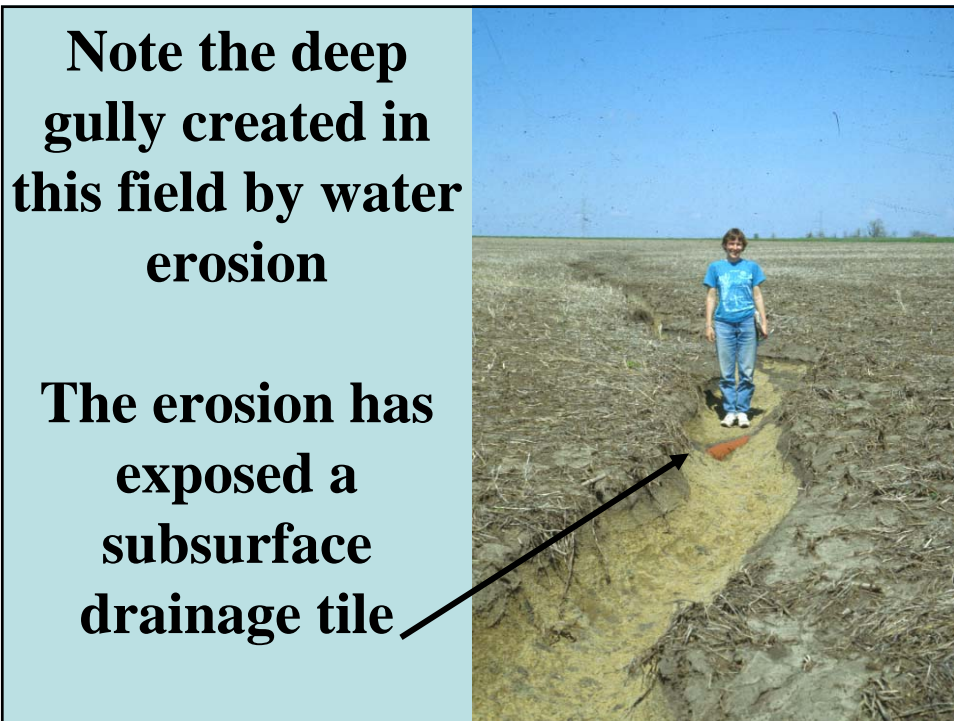- Stream Bank

- Does the soil remain or depart the field??

Soil Erosion by Wind

- Saltation
- Suspension
- Surface Creep

- Does the soil remain or depart the field?

Note rill erosion between rows and sediment accumulated on lower slope

Note the deep gully created in this field by water erosion

The erosion has exposed a subsurface drainage tile

Wind & Water Erosion

- Impact of missing fence rows
- Larger farms and unsheltered distances
- Crop Rotation
- Buffers, Filter Strips and Waterways
- Gravity…soil never goes uphill, even with tillage!

Severe Erosion
On Sloping Land

Use of Grassed
Buffer Strips Along
Drainage Ways

Which is best?

- Structures
  - WASCoB's
  - Terraces
  - Drop-boxes
  - Filter strips
  - Buffers
- Practices
  - No-till
  - Plant perpendicular to slope

Impact of Erosion on Soil Productivity

- **Reduces Soil Depth**
  - decreases root growth
  - decreases water holding capacity
- **Reduces soil organic matter by removing the top soil**
  - decreases natural fertility
  - lowers CEC (nutrient holding capacity)

Plow Layer
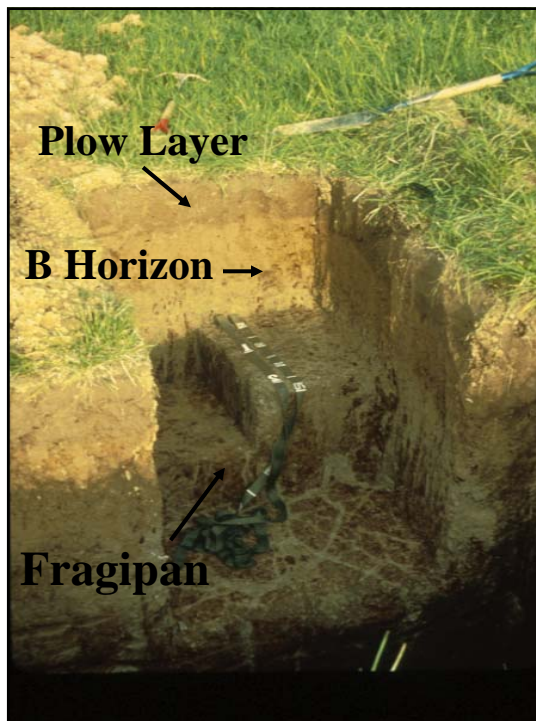
B Horizon →

Fragipan

Example of the impact of erosion on plant growth on a soil having a fragipan at 30 inches

Impact of Erosion on
Soil Productivity, cont'd

- **Increases clay from the exposure of subsoil (B horizon):**
    - **leads to poor soil structure**
    - **makes tillage more difficult**
    - **increases surface sealing**
    - **reduces infiltration**
    - **increases runoff**
- **Can increase stoniness of surface**

Erosion and Water Quality

- Sediment clogs ditches, streams, rivers and lakes (note the need to dredge local lakes).

- Sediment from surface soil may carry nutrients and pesticides; as these particles equilibrate with water they release adsorbed chemicals - most P gets to surface water by erosion.

Construction site upstream to left

Wooded, turf farm, established homes upstream to right

Sediment runoff into stream following rainfall event

Note the effect of surface protection

Universal Soil Loss Equation

$$A = R \times K \times LS \times C \times P$$

A – computed soil loss tons per acre

R – rainfall intensity

K – soil erodibility

LS – length and degree of slope

C – cropping practices

P – erosion practices

Wind Loss Equation

$$E = f(I \times K \times C \times L \times V)$$

E-soil loss in Tons per Acre

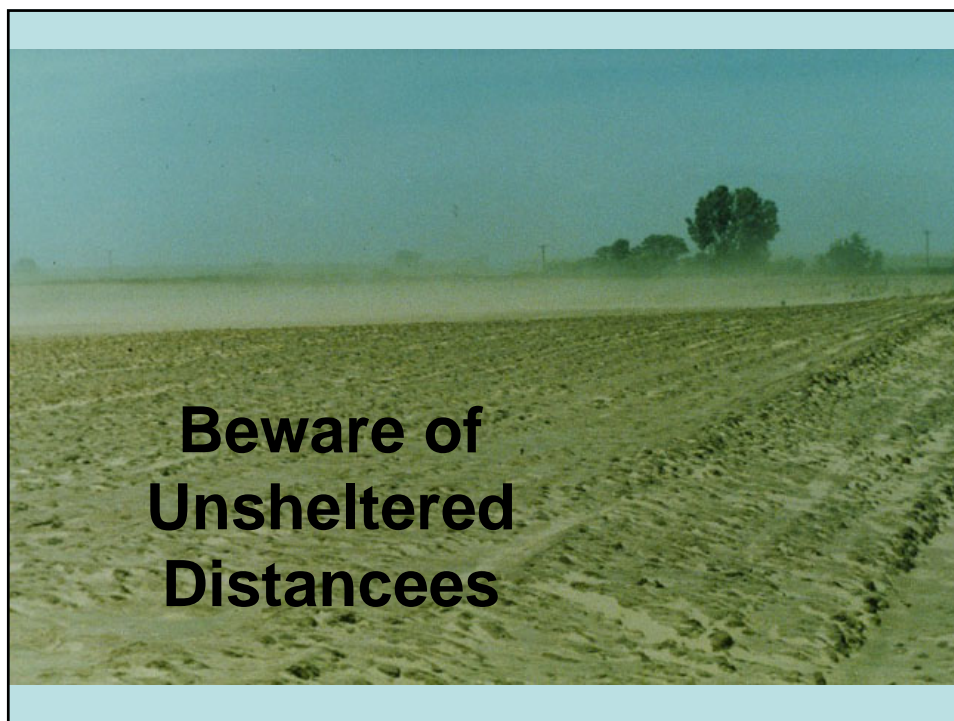I – soil erodibility

K - soil roughness

C – climate factor

L – field length

V – quantity vegetative cover

Beware of Unsheltered Distancees

Advance No-till Corn Adoption!

Protect waterways buffers, and filter strips when spraying!

Questions???

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